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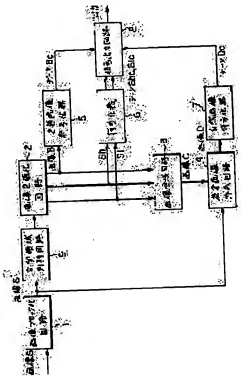
(54) CODING METHOD FOR STILL NATURAL PICTURE WITH MIXED EXISTENCE OF BINARY PICTURE

(57)Abstract:

PURPOSE: To realize coding by which a white/black gradation picture and a color picture including a character area are less deteriorated by coding the character area through the use of the binary picture coding system and coding the remaining picture with the natural picture coding system.

CONSTITUTION: A character area discrimination circuit 9 analyzes a received picture S' and gives a command to a picture element binarizing circuit 2 so as to apply binarizing processing to a picture element block only including a character. A binary picture coder 5 codes a picture B received from the circuit 2. A coder 9 codes mean values Sh, S1 of the picture received from the circuit 2 for each block, and a natural picture coder 7 codes a picture D received from a differential picture generating circuit 4. A signal output circuit 8 receives data Bc, Shc, S1c, Dc coded from the coders 5-7 and outputs a signal in a specific format. Thus, it is possible to realize the coding causing less deterioration of a



CLAIMS

[Claim(s)]
[Claim 1] A quiescence color picture or monochrome gradation image is divided into two or more pixel blocks (nxm pixel). Make each pixel within each block binary with a certain threshold (Sa), and it outputs as a binary coding output. Each pixel value of said the pixel block of a subject-copy image of each which made binary and was encoded is replaced and made into specific calculated value based on each pixel value. The calculated-value coding output which encoded the replacement •••••••• itself [this] is outputted. Said replaced pixel block is outputted as a natural image coding output. The coding approach of the binary image mixture quiescence natural image which takes out the synthetic output which compounded said binary coding output, said calculated-value coding output, and said natural image coding output as a coding output of said quiescence color picture or monochrome gradation image.
[Claim 2] A quiescence color picture or monochrome gradation image is divided into two or more pixel blocks (nxm pixel). Each pixel within each block is detected as a pixel block containing a binary image part or a binary image part. Make binary each pixel within the detected this block based on a threshold (Sa), and it outputs as a binary coding output. Each pixel value of said the pixel block of a subject-copy image of each which made binary and was encoded is replaced and made into specific calculated value based on each pixel value. The calculated-value coding output which encoded the replacement •••••••• itself [this] is outputted. Said replaced pixel block is outputted as a natural image coding output. The coding approach of the binary image mixture quiescence natural image which takes out the synthetic output which compounded said binary coding output, said calculated-value coding output, and said natural image coding output as a coding output of said quiescence color picture or monochrome gradation image.
[Claim 3] each pixel value within said block -- •••• (Sa) -- size -- a case -- said threshold -- size -- the average (Sh) of the value of each pixel with a value -- said average -- smallness -- the case where it has a value -- said average -- smallness -- the coding approach of the binary image mixture quiescence natural image according to claim 1 or 2 characterized by using the average (Sl) of the value of each pixel with a value as specific calculated value.
[Claim 4] The coding approach of the binary image mixture quiescence natural image according to claim 2 characterized by detecting blocks other than the block whose difference of the maximum of each pixel within said block and the minimum value is about 0 as a pixel block containing a binary image regional block or a binary image part.
[Claim 5] The coding approach of the binary pixel mixture quiescence natural image according to claim 2 detecting-as pixel block containing binary image regional block or binary image part characterized by the block which calculated distribution of each pixel value within said pixel block, and was concentrated on the specific value said whose pixel value is one or two.
[Claim 6] The coding approach of the binary pixel mixture quiescence natural image according to claim

1 or 2 characterized by preventing the provincial accent of the image of an edge part by removing an unnecessary high frequency component by the pixel in the edge part of a natural image to the pixel value which lengthened the pixel value replaced using gradation information from the subject-copy image pixel value in the case of said natural image coding.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the high-efficiency-coding approach of monochrome gradation image or a color picture.
[0002]
[Description of the Prior Art] Although the various coding methods for a color static image (a gradation image is also included) are proposed conventionally, it is CCITT SG VIII especially. ISO IEC/JTC1/SC29 2 called the JPEG method which is advancing examination together, and a JBIG method The international-standards method of •• attracts attention.
[0003] JPEG proposed as a coding method of a color static image (Joint Photographic Expert Group) Although a method is not an information preservation form, it is a method which can encode a gradation image in high efficiency. Rectangular cosine conversion which is one of the orthogonal transformation methods which are [as opposed to / in this JPEG method / a color static image] generally efficient methods (DCT) It is adopted. DCT It is the method which divides an image into a block, gives a discrete cosine transform for every block, and encodes the output coefficient. It quantizes independently for every frequency component, and an output coefficient assigns a quantifying bit number for every transform coefficient so that coding effectiveness may become the optimal. The color static image of using an encoder without an information loss from the magnitude of the amount of information included in the image unlike the case where the image which consists of binary is encoded is not practical, and, that quantization on suitable level is required, and generally can attain high coding effectiveness by making quantization in a RF field coarse.
[0004] JBIG proposed as an International Standard proposal as a coding method of a binary image on the other hand (Joint Bi-level Image Expert Group) A method is an information preservation form coding method which can encode without informational lack the image by which the binary expression was carried out fundamentally in high efficiency.
[0005] The target image is assumed to be the multicolor document with which the document with which monochrome alphabetic character and a color picture are intermingled or a color alphabetic character, monochrome alphabetic character, and a color picture are intermingled only rather than a color picture by color facsimile. However, it is DCT like a JPEG method. The adopted coding method has the fault that image quality degradation of an alphabetic character field is large, to the document with which an alphabetic character and an image are intermingled. Therefore, [0006] as which some approaches of encoding the document with which the trouble of such a conventional method is solved and a binary alphabetic character and a gradation image are intermingled, or a binary color document in high efficiency are proposed
[Problem(s) to be Solved by the Invention] It is an orthogonal transformation coding method (DCT) in

the above-mentioned conventional technique to a color picture like ••••. When applying, a noise arises around the edge of the alphabetic character contained in an image, and there is a fault that the quality of an image deteriorates. In quantization by this reason and DCT, it is because quantizing efficiently will quantize this coarsely, including a high frequency component mostly and it becomes impossible to disregard the noise around an alphabetic character as a result since the pixel value change between that perimeter is large, when a pixel like the edge of an alphabetic character which changes steeply exists in an image, since it is carried out also to the edge of an alphabetic character.

[0007] This invention solves the trouble of the above-mentioned conventional technique, and aims at offering the coding approach of a binary image mixture quiescence natural image that the encoded image with little degradation can be obtained, to the mixture document of monochrome gradation image, color picture or multicolor which included the field where an edge is steep like an alphabetic character, and a natural color.

[0008]

[Means for Solving the Problem] The description of this invention is in a coding side to separate the alphabetic character field (for a color alphabetic character to also be included outside monochrome alphabetic character) unsuitable for the natural image coding method of the conventional technique from the target monochrome gradation image or a color picture, encode this alphabetic character field using a binary image coding method, and encode the remaining image by the natural image coding method. In a decryption side, the image encoded by each coding method is decoded separately, this is compounded, and a subject-copy image is obtained.

[0009] This detail is as follows. In a coding side, the target subject-copy image is divided into the block of a pixel, it detects by the approach of describing below whether this field, i.e., said alphabetic character field, that is not suitable for the natural image coding method of the conventional technique per division block existing, and binary-ized processing of an alphabetic character field is performed after that.

[0010] The description of an alphabetic character field is detected as the following by the detection approach (the judgment approach) of an alphabetic character field, and draw processing. Any of an activity independently and the activity to combine are sufficient as the following approach. (1) In an alphabetic character field, the difference of the value of a •••••• pixel is large as an approach by max and the minimum value as compared with a natural image. Using this description, the maximum and the minimum value of a pixel of a pixel block are investigated, and that pixel block judges whether it is an alphabetic character field by the size of that difference. That is, for example, it is Smin about Smax and the minimum value in the value greatest with the pixel value within a block. From the threshold T which carries out and has the difference F, F>=T, if it becomes, it will be the approach of making it into the alphabetic character field containing an edge.

(2) As an approach by distribution of a pixel value, the background of a field that generally an alphabetic character exists has many cases of a simple color scheme (or gradation), and the property to concentrate the part of an alphabetic character and the value of the pixel which constitutes the background on a specific value is seen. Using this, distribution of the pixel value of a pixel block is investigated, and the peak of the distribution which a pixel value concentrates judges this pixel block to be an alphabetic character field, one piece thru/or when two pieces exist.

[0011] namely, -- for example, in order to investigate distribution of the pixel value which block each pixel can take, it is shown in drawing 4 -- as -- a certain specific pixel value x several [of the pixel within the block to take] -- the histogram of H (x) is created. this histogram -- a certain threshold (parameter) M using -- H(x)-H(x-1) > M -- and -- H (x) Pixel value x used as -H(x+1) > M It investigates and it is considered that this is the peak of distribution of a pixel value. Value x used as this peak 1 An individual thru/or 2 If individual existence is recognized, that pixel block is judged to be an alphabetic character field, and in being other, it will judge with an ungrammatical sentence

character field.
[0012] A judgment and draw processing of an alphabetic character field are aimed at reducing the coding number of bits of the binary-ized image generated by the binary-ized processing mentioned later, and even if an improvement of the image quality by coding does not perform this processing, it can attain.
[0013] Binary-ized processing of an alphabetic character field is explained below. First, 1 The threshold (Sa) which distributes each pixel value to binary with the concentration of each pixel within a block is calculated. As a threshold, it is 1, for example. The arithmetic average value of the concentration of each pixel within a block is computed, and this is set to Sa. the block which the alphabetic character field described above extracted and was judged that an alphabetic character field exists in processing -- criteria [threshold / this / (Sa)] -- carrying out -- the thing of a value higher than this -- the thing of "1" and a low value -- "0" •• -- binary-ized image B carried out It generates. Binary-ized processing described above is not performed in the block judged that an alphabetic character field does not exist, but it is the binary-ized image B. It is "1" altogether. It carries out.
[0014] The concentration information on the binary-ized image within a block is generated as follows continuously. By the block judged that an alphabetic character field exists, it is "0" of a binary-ized image. A field and "1" A field exists. About each field, the average of the concentration of a pixel is computed as follows and this is generated as concentration information on an image. a binary-ized image -- setting -- "1" the arithmetic average value of the pixel value of a field -- Sh -- the same -- "0" The arithmetic average value of the pixel value of a field is set to Sl. Binary-ized image B It is the binary-ized image B from Sh and Sl (gradation information). The pixel value is a pixel "1" If it becomes, to Sh, a pixel value will be "0". Image C transposed to Sl when becoming It generates.
[0015] Next, this image C It is the subject-copy image S about each pixel value. It lengthens from a pixel value and is Image D. It generates. Image B The gradation information Sh and Sl which carried out binary coding is encoded, and it is Image D. The signal output of each encoded data which carried out color picture (natural image) coding is carried out at a decryption side.
[0016] In color picture coding, an image is divided into each color component of y, cb, and cr, and is processed like the above-mentioned binary-ized image for every color component, using the conventional technique, and it is an image. Dy, Dcb, and Dcr are generated and it encodes. It is drawing 7 (a) about the concrete example of an above-mentioned coding step. - (d) It is shown. this drawing (a) •••• -- subject-copy image S It constitutes from three pixel blocks and the 1st block is [an ungrammatical sentence character field, the 2nd, and the 3rd block] alphabetic character fields. It is the place of the chromatic key mold shown by hatching as an alphabetic character part in the alphabetic character field solid case (binary part). Subject-copy image S Binary-ized image B When it creates, it is this drawing (b). It becomes. the part of void -- pixel value "1" it is -- a black part -- section equipment value "0" it is . Pixel block 1 Since it is not set as the object of binary-ized processing, all pixel values are "1". It replaces. Binary-ized image B Image C If it creates, it will become this drawing (c). Binary pixel value "1" It transposes to the value of Sh and a place is binary pixel value "0". A place is transposed to Sl. Subject-copy image S Image C Image D When it creates, it is this drawing (d). It becomes. Subject-copy image S Image C which is in homotopic from each pixel value Color picture D from which the chromatic key mold part as an alphabetic character part escaped when the pixel value was lengthened It becomes. here -- color picture D •••••• -- •••• -- although not expressed -- in practice -- y, cb, and cr It creates about three colors. Above-mentioned explanation is processed per 1 pixel block in practice, although explained in the form which connected 3 blocks. Image B and the gradation information Sh which were created as mentioned above, Sl, and image D If it encodes and outputs to a decryption side, at a decryption side, it is a decryption (B, Sh, Sl, D'), respectively. It carries out. Decrypted image B It is Image C at the gradation information Sh and Sl. Image C restored and restored Image S' will be obtained for image D' by

compounding (addition).
[0017] A decryption is performed as follows. It is [data / which were encoded] in binary-ized data with a natural image decryption vessel about Sh and Sl with a decryption (gradation information) machine at a binary decryption machine. Dy Dcb D cr is decrypted, respectively, and Image B and image D' are compounded and generated. And binary-ized image B Gradation information Sh and Sl Binary-ized image B The pixel value is a pixel "1" If it becomes, to Sh, a pixel value will be "0". Image C transposed to Sl when becoming It generates. This image C Image D' is added and it is Image S. Image S' which is the decrypted image is generated.
[0018] Moreover, the image read with the scanner is the property D the edge part of an alphabetic character becomes blunt in the alphabetic character and background boundary part in an image, i.e., an image. It has the property in which an unnecessary high frequency component rides. It is solvable, if the following approaches are used in order to amend this provincial accent. It sets to a coding side and it is an image D. It is in charge of encoding with a natural image encoder, and it is an image D. Different property D, i.e., image, from a common natural image It is Image D in order to remove the high frequency component to which an edge fades in profile (edge) parts, such as an inner body. After performing data smoothing, it encodes with a natural image encoder and it is the approach of performing image-restoration processing to image D' decrypted with the natural image decryption vessel, in a decryption side.
[0019] as an example -- binary image B Each pixel value under pixel block Bi and j Image D to generate Value of a response pixel Di and j a generation type is changed -- Di and j Change is made small. For this reason, at a coding side, they are Di, j = Si, j-Ci, and j+P. (Bi, j = 1)
= Ci,j - Si,j +P (Bi,j =0)
P=Si and j At the maximum x0.5 decryption side which can be taken, they are S'i and j. =D'i, j-C'i, j+P (B'i, j = 1)
=C'i,j -D'i,j +P (B'i,j =0)
P= Si and j It processes by the formula of maximum x0.5 which can be taken.
[0020]
[Example 1] Drawing 1 It is the block diagram of the coding method by ********. 1 A ****** blocking circuit and 2 An image binary-ized circuit and 3 An image composition circuit and 4 It is a subtraction-image creation circuit. 5 A ** binary image encoder and 6 An encoder and 7 The natural image encoder of the conventional technique, and 8 It is a signal output circuit. Image blocking circuit 1 Subject-copy image S For example, length 8 Pixel x width 8 Pixel = 64 It divides into the pixel block which consists of pixels. Image S' which consists of all divided pixel blocks is the alphabetic character field distinction circuit 9. A sequential output is carried out. Alphabetic character field distinction circuit 9 Image blocking circuit 1 It is the image binary-ized circuit 2 only to the pixel block judged that image S' which received is analyzed for every pixel block, and an alphabetic character is included. It is the image binary-ized circuit 2 about directions so that it may set and binary-ized processing may be performed. It gives.
[0021] Alphabetic character field distinction circuit 9 The following distinction circuits can be considered as an example. First, the maximum and the minimum value of a pixel value within a pixel block are investigated, the pixel block with the very large difference of maximum and the minimum value is judged to be an alphabetic character field, and the difference of maximum and the minimum value is almost 0. A near pixel block is judged to be an ungrammatical sentence character field. in order to investigate distribution of the pixel value which the pixel can take to a pixel block in the case where it cannot judge whether it is an alphabetic character field, by the above-mentioned judgment approach -- drawing 4 it is shown -- as -- a certain specific pixel value x several [of the pixel within the block to take] -- the histogram of H (x) is created. this histogram -- threshold (parameter) M using -- H (x)-H(x-1) > M and -- Pixel value x used as H(x)-H(x+1) > M It investigates and it is considered that

this is the peak of distribution of a pixel value. Value x used as this peak 1 An individual thru/or 2 If individual existence is recognized, that pixel block is judged to be an alphabetic character field, and in being other, it will judge with an ungrammatical sentence character field.
[0022] The alphabetic character field distinction circuit shown above is 1. It cannot pass for an example but the circuit only by the maximum minimum value etc. can be applied to others. At this example, it is the image binary-ized circuit 2. By reducing the image to process, it is Image B. And it is effective in reducing the coding number of bits when encoding values Sh and Sl.
[0023] Image binary-ized circuit 2 Image blocking circuit 1 The divided pixel block is received and the average Sa of the pixel value of the pixel contained in a pixel block is computed for every pixel block. every [next,] block among the pixels of image S' -- a pixel with a larger pixel value than Sa -- "1" and a pixel with a low pixel value -- "0" Changed image B generating -- image composition circuit 3 And binary image encoder 5 It transmits. simultaneous -- every block -- the average Sl of the pixel value of a pixel with a pixel value smaller than the averages Sh and Sa of the pixel value of a pixel with a larger pixel value than Sa -- computing -- image composition circuit 3 and difference -- value encoder 6 It transmits. Image composition circuit 3 Image binary-ized circuit 2 Received image B The averages Sh and Sl for every block are used, and it is Image B. The pixel value is "1" for all pixels. If it becomes A pixel value is transposed to the average Sh of the block with which the pixel is contained, and, on the other hand, the pixel value is "0". Image C which transposed the pixel value to the average Sl of the block with which the pixel is contained when becoming It generates. Image C Subtraction-image creation circuit 4 It is transmitted. Subtraction-image creation circuit 4 Blocked image S' and image composition circuit 3 Received image C About all pixels, it is Image S. A pixel value to image C Image D with the pixel value which lengthened the pixel value It generates and is the natural image encoder 7. It transmits. Binary image encoder 5 Image binary-ized circuit 2 Received image B It is the signal output circuit 8 about the data Bc encoded and encoded. It transmits. binary image encoder 5 as an example -- JBIG and MMR etc. -- the existing encoder can be used. Encoder 6 Image binary-ized circuit 2 Data Shc which encoded the average values Sh and Sl for every block of an image which received, and were encoded And Slc It transmits to the signal output circuit 8. Encoder 6 The DPCM method which encodes a difference with the average of the block before continuing as an example can be used. Natural image encoder 7 Subtraction-image creation circuit 4 Received image D It is the signal output circuit 8 about the data Dc encoded and encoded. It transmits. As an example of a natural image encoder, it is DCT of the above-mentioned conventional technique. It can use. Signal output circuit 8 The binary image encoder 5, an encoder 6, and natural image encoder 7 The encoded data Bc and Shc, Slc, and Dc are received, and a signal is outputted in a specific format.
[0024] drawing 2 it is alike and the decryption equipment of the coding method by this invention is shown. For 11, as for a binary image decryption machine and 13, a signal input circuit and 12 are [a decryption machine and 14] natural image decryption machines. 15 is an image composition circuit and 16 is a subtraction-image composition circuit. The signal input circuit 11 is the data Bc and Shc which inputted the encoded signal and were encoded, Slc, and Dc'. It generates. Data Bc are 2. To the image decryption machine 12, it is Data Shc. And data Slc To the decryption machine 13, it is data Dc'. It transmits to the natural image decryption machine 14, respectively. The binary image decryption machine 12 is the image B which decrypted the data Bc received from the signal input circuit 11, and was decrypted. It transmits to the image composition circuit 15.
[0025] as the example of the binary image decryption machine 12 -- drawing 1 Binary image encoder 5 Corresponding JBIG and corresponding MMR etc. -- a decryption machine can be used. The decryption machine 13 is the data Shc received from the signal input circuit 11. And Slc It decrypts and the decrypted values Sh and Sl are transmitted to the image composition circuit 15. As an example of the decryption machine 13, it is drawing 1. Encoder 6 A corresponding DPCM method can be used. The natural image decryption machine 14 decrypts the data Dc received from the signal input

circuit 11, and transmits decrypted image D' to the subtraction-image composition circuit 16. As an example of a natural image decryption machine, it is drawing 1. Natural image encoder 7 Corresponding DCT It can use. The image composition circuit 15 is Image C from Image B, and Sh and SI which received from the binary image decryption machine 12 and the decryption machine 13. It compounds and transmits to the subtraction-image composition circuit 16. The composite approach is drawing 1. Image composition circuit 3 It is completely equivalent. The subtraction-image composition circuit 16 is the image C received from the image composition circuit 15. The pixel value and Image C of image D' which were received from the natural image decryption machine 14 Image S" with the pixel value which applied the pixel value is outputted as a decryption image. In drawing 8 - drawing 11 , it is the subject-copy image S. A sample is shown. Lengthwise direction 516 It constitutes from a pixel and is 100 from a top. Subject-copy image S when encoding a pixel eye horizontally It is drawing 8 about a signal. Image B It is drawing 9 about a signal. Pixel C To drawing 10, it is Image D about a signal. A signal is shown in drawing 11. this invention -- S the case where it is the image with which the alphabetic character was intermingled -- an alphabetic character field -- image B the averages Sh and SI -- another -- encoding -- further -- image B Image C equivalent to the image encoded by the averages Sh and SI Image S from -- removing -- image S Degradation of an alphabetic character field can be prevented as compared with encoding using a direct orthogonal transformation encoder.

[0026]

[Example 2] drawing 3 •• and example 1 from -- alphabetic character field distinction circuit 9 It is the removed block diagram. Alphabetic character field distinction circuit 9 in an example 1 It is the example which performs binary coding processing and natural image coding processing about all the pixels of image S', without performing alphabetic character field discernment processing in which it can set. 1 since -- 8 •••••• -- example 1 It applies.

[0027]

[Example 3] Drawing 5 •• and example 2 It is the block diagram which added the image smoothing circuit of 10. 1 since -- 8 •••••• -- example 1 It applies. The image smoothing circuit 10 is the subtraction-image creation circuit 4. Received image D Natural image encoder 7 after enabling it to encode more efficiently a field with the high frequency component which graduates and is not suitable for a natural image encoder It transmits. Image smoothing circuit 7 It considers as an example, for example, is Image B first. The approach of generation of Image D is changed with a pixel value, and it is Image B. A pixel value is "1". If it becomes Example 1 It is Image D similarly. It generates and, on the other hand, is Image B. A pixel value is "0". It will be an example 1 if it becomes. To reverse, it is Image C. Image S It lengthens and is Image D. A circuit which is generated can be used. This image smoothing circuit 7 It is drawing 6 about the block diagram of the decryption equipment at the time of encoding by using. It is shown. 11-16 are an example 1. Drawing 2 It applies to decryption equipment. 17 is image restoration equipment. Image restoration equipment 17 is previous drawing 5 to image D' which received from the natural image decryption machine 14. Processing which returns data smoothing which the image smoothing circuit performed is performed. Image smoothing circuit 7 described above It reaches and the image restoration circuit 17 is 1. It cannot pass for an example but the circuit which the steep change of an image other than the above is dulled, and returns it can be applied. In this example, it is effective in raising the coding effectiveness in a natural image encoder, and is an example 1. You may apply.

[0028] Drawing 12 - drawing 15 are Image S, Image C, and Image D which were processed by this invention. It is an example.

[0029]

[Effect of the Invention] As mentioned above, little coding of degradation of monochrome gradation image including an alphabetic character field and a color picture is realizable by this invention's making

an image binary for every block of an image from the target monochrome gradation image or color picture, encoding it with an encoder without an information loss to a binary image, and encoding the image excluding the above-mentioned binary image from the subject-copy image with an orthogonal transformation encoder. Effectiveness S/N by this invention A ratio and a coding number-of-bits cutback are as in degree table.

[A table 1]

各画像の符号化ビット数とS／N比

画 像	方 法	総 計 (bytes)	JPEG (bytes)	JBIG (bytes)	DPCM (bytes)	S／N (dB)
白黒 2値文字 (mono)	JPEG	65289	—	—	—	28.4
	NonMM	39309	9611	22594	7104	39.0
	MM	25377	10975	8629	5773	38.6
	PEAK	24247	12627	6508	5112	38.7
カラーy 2値文字 (color-y)	JPEG	42248	—	—	—	31.2
	NonMM	35134	7882	20319	6933	41.2
	MM	23701	10527	6913	6261	40.1
	PEAK	23444	12259	5433	5752	40.0
カラーcb 2値文字	JPEG	17781	—	—	—	32.4
	NonMM	16592	2097	11578	2917	43.6
	MM	13795	9691	1574	2530	36.1
	PEAK	12318	6314	3252	2753	38.2
カラーcr 2値文字	JPEG	18617	—	—	—	31.9
	NonMM	14967	1942	10269	2756	44.2
	MM	11030	6369	2364	2297	38.0
	PEAK	11291	5800	3065	2426	37.8

JPEG Only a JPEG method is NonMM. With no judgment of un-dividing / alphabetic character field.
MM Approach by maximum/minimum value. T= 32.
PEAK Approach by distribution of a pixel value. M= 6, W1 =32, and W2 =128.

[Translation done.]

• NOTICES •

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.•••• shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the high-efficiency-coding approach of monochrome gradation image or a color picture.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Although the various coding methods for a color static image (a gradation image is also included) are proposed conventionally, it is CCITT SG VIII especially. ISO IEC/JTC1/SC29 2 called the JPEG method which is advancing examination together, and a JBIG method The international-standards method of ** attracts attention.
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[0004] JBIG proposed as an International Standard proposal as a coding method of a binary image on the other hand (Joint Bi-level Image Expert Group) A method is an information preservation form coding method which can encode without informational lack the image by which the binary expression was carried out fundamentally in high efficiency.
[0005] The target image is assumed to be the multicolor document with which the document with which monochrome alphabetic character and a color picture are intermingled or a color alphabetic character, monochrome alphabetic character, and a color picture are intermingled only rather than a color picture by color facsimile. However, it is DCT like a JPEG method. The adopted coding method has the fault that image quality degradation of an alphabetic character field is large, to the document with which an alphabetic character and an image are intermingled. Therefore, the trouble of such a conventional method is solved and some approaches of encoding the document with which a binary alphabetic character and a gradation image are intermingled, or a binary color document in high efficiency are proposed.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] It is an orthogonal transformation coding method (DCT) in the above-mentioned conventional technique to a color picture like ••••. When applying, a noise arises around the edge of the alphabetic character contained in an image, and there is a fault that the quality of an image deteriorates. In quantization by this reason and DCT, it is because quantizing efficiently will quantize this coarsely, including a high frequency component mostly and it becomes impossible to disregard the noise around an alphabetic character as a result since the pixel value change between that perimeter is large, when a pixel like the edge of an alphabetic character which changes steeply exists in an image, since it is carried out also to the edge of an alphabetic character. [0007] This invention solves the trouble of the above-mentioned conventional technique, and aims at offering the coding approach of a binary image mixture quiescence natural image that the encoded image with little degradation can be obtained, to the mixture document of monochrome gradation image, color picture or multicolor which included the field where an edge is steep like an alphabetic character, and a natural color.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is coding side equipment configuration drawing which applied this invention.
[Drawing 2] It is decryption side equipment configuration drawing which applied this invention.
[Drawing 3] It is coding side equipment configuration drawing which applied this invention (approach except alphabetic character field recognition).
[Drawing 4] It is the example Fig. of the pixel value distribution map in a pixel block.
[Drawing 5] It is coding side equipment configuration drawing which applied this invention (approach using image smoothing).
[Drawing 6] It is decryption side equipment configuration drawing which applied this invention (approach using image smoothing).
[Drawing 7] It is the schematic drawing showing the example of processing by this invention approach.

[Drawing 8] Subject-copy image S processed by this invention It is the wave form chart showing a sample.
[Drawing 9] Image B processed by this invention It is drawing showing pixel value change.
[Drawing 10] Image C processed by this invention It is drawing showing pixel value change.
[Drawing 11] Image D processed by this invention It is drawing showing pixel value change.
[Drawing 12] Image S processed by this invention It is drawing showing one example as a monochrome image.
[Drawing 13] Image B processed by this invention It is drawing showing one example as a monochrome image.
[Drawing 14] Image C processed by this invention It is drawing showing one example as a monochrome image.
[Drawing 15] Image D processed by this invention It is drawing showing one example as a monochrome image.
[Description of Notations]
1 Image Blocking Circuit
2 Image Binary-ized Circuit
3 Image Composition Circuit
4 Subtraction-Image Creation Circuit
5 Binary Image Encoder
6 Encoder
7 Natural Image Encoder
8 Signal Output Circuit
9 Alphabetic Character Field Distinction Circuit

10 Image Smoothing Circuit
11 Signal Input Circuit
12 Binary Image Decryption Machine
13 Decryption Machine
14 Natural Image Decryption Machine
15 Image Composition Circuit
16 Subtraction-Image Composition Circuit
17 Image Restoration Circuit

[Translation done.]

PATENT ABSTRACTS OF JAPAN

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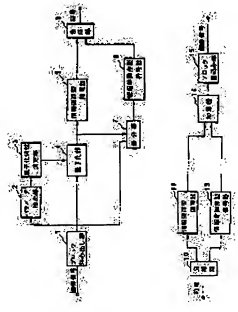
(54) SYSTEM AND DEVICE FOR ENCODING AND DECODING PICTURE SIGNAL

(57)Abstract:



PURPOSE: To make it possible to reproduce edge parts exactly by separating edge parts in which the level changes abruptly in picture signals and encoding them.

CONSTITUTION: Inputted codes are separated to the first code (output code of an information storing type encoder 5) and the second code (output code of an information non-storing type encoder 8) in a separating section 10 according to synchronizing signals. The first code after separation is decoded by an information storing type decoder 11 and quantized output q(i,j) is reproduced, and the second code after separation is decoded by an information non-storing type decoder 13, and residual signals d'(i,j) for which quantizing process is made is reproduced. The information storing type decoder 11 decodes run length codes and reproduces run of '1' and '0', and at the same time, reproduces q(i,j) by making PCM encoded values of fmax and fmin correspond as level of '1' and '0' respectively. The information non-storing type decoder 13 decodes orthogonal transformation coefficient after quantizing encoded in block unit, and reproduces residual signals d'(i,j) for which quantizing process is made by making reverse orthogonal transformation. The residual signals d'(i,j) are added by an adder 14 in block unit and decoded picture signals f(i,j) are generated.